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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/682,900	10/31/2001	William Steven Lanier	59589.000004	2925

21967 7590 12/08/2003

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EXAMINER

SODERQUIST, ARLEN

ART UNIT	PAPER NUMBER
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1743

DATE MAILED: 12/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/682,900

Applicant(s)

LANIER ET AL.

Examiner

Arlen Soderquist

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 6) ☐ Other: ____

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1. Claim 20 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The limitation of claim 20 is found in claim 12.

2. Claims 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 1 and 12, the structural connections between the various components are not clear in that the in fluid communication language does not require any particular order of connection for the filter, chamber, means for removing water or analyzer or that the various elements are even connected to anything more than the sample gas line. In claim 4 "a third one of the at least one analyzer" does not have proper antecedent basis since claim 2 only specifies a first analyzer. Thus it is not clear if applicant intended the claim to be dependent from claim 3 or if the above phrase is really intended to mean further comprising a second analyzer. Claim 14 has the same problem however the language used is less awkward than the language used in claims 2-4. In claim 22 the chamber has the same problem as claims 1 and 12 in that its structural connections relative to the other elements is not properly defined and can be totally separate from the remaining elements except for the sample gas line.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 8-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Lawson (US 4,073,619). In the patent Lawson teaches method and apparatus for sampling a gas for analysis. Gas is transferred for analysis from a sampling probe (15), which may be in the waste gas duct (14) of a steelmaking vessel (10), to remote analyzers consisting of a paramagnetic oxygen analyzer (31) and infrared analyzers (32-33) for carbon monoxide and carbon dioxide. A high transfer speed is achieved by passing the gas at a relatively high gas transfer rate from the sampling probe (15) along a relatively long first sampling duct (16), while a relatively short duct (25) takes gas at a relatively low gas transfer rate from the long duct to the analyzers. Waste gas

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sampld through the probe passes at a rate of about 130 liters per minute along a first sampling duct (16) through a filter (17, chamber positioned adjacent the stack) and a cooler (18) to a vacuum pump (19). In the filter, fume particles are removed and in the cooler, the gas temperature is reduced to normal ambient temperature (moisture would be removed in this process). Beyond the pump the sampled gas continues along the duct at a positive pressure until the duct leads into an analysis room (20) some distance from the sampling point. The duct passes through the analysis room and the bulk of the sampled gas is exhausted to atmosphere (24). No restriction is included in the exhaust line beyond the analysis room to prevent creation of back pressure and thereby increase gas transport time. A second sampling duct (25) branches from the first duct within the analysis room and part of the sampled gas is drawn along the second duct and through a further filter (26) at a rate of about 5 liters per minute by a pump (27). From the pump the second sampling duct leads through a further cooler (28, means for removing water), to remove any residual moisture in the gas.

5. Claims 1-2, 8, 10, 12, 16, 20, 22-29 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Izumi (JP 51-3289). In the published application Izumi teaches analysis of nitrogen oxides in waste gases. In figure 1 NO_x in waste gases is oxidized to N_2O_5 and HNO_3 , which are then thermally decomposed to NO_2 . Then, the amount of NO_2 is directly determined without condensing water vapor in the waste gases by an analysis method such as ESR method. Optionally as shown and described in figure 4 and its associated description, the NO_2 in the waste gases is reduced to NO by an NO_2 converter (31), the amount of which is determined by chemiluminescence (34), ir spectroscopic, or potentiostatic electrolysis methods after removing moisture from the waste gases. The second to last paragraph of page 598 (fourth page of the published application) teaches using molybdenum (Mo) in the NO_2 converter at a temperature of between 350-450 °C to cause the conversion of NO_2 into NO . In figure 1 element 3 is a dust filter and would have a chamber with an interior. Elements 22-25 are heaters. Page 597 teaches maintaining the gas sample at $110\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$ for avoiding water problems.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
7. Claims 6-7 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Izumi as applied to claims 2 and 12 above, and further in view of Yamaki (US 4,073,866). Izumi does not teach a carbon and molybdenum combination as the surface for converting the gas to NO.

In the patent Yamaki teaches a process for converting nitrogen dioxide into nitrogen monoxide in which a gas containing nitrogen dioxide is brought into contact at a temperature ranging from 50 °C to 400 °C with a carbide of a metal selected from the group consisting of chromium, molybdenum, tungsten, vanadium, titanium, tantalum, silicon and boron or a composite carbide of such metals, thereby reducing nitrogen dioxide contained in the gas to nitrogen monoxide. In the background section of column 1 Yamaki teaches that measurement of nitrogen oxides in an analyzer utilizing chemiluminescence is known. By the use of this analyzer, the concentration of nitrogen monoxide contained in environmental atmosphere or exhaust from apparatus can be measured precisely. For analysis of nitrogen dioxide, however, the analyzer necessitates the use of a converter capable of converting nitrogen dioxide into nitrogen monoxide. In the converter, carbon or a mixture of molybdenum oxide and carbon is used as reducing agent. However, a converter utilizing this reducing agent has as a drawback that it is effective only at high temperatures within a narrow range from 350 °C to 450 °C and these conditions apparently fail to make the conversion process efficient. Furthermore, there is an additional drawback that since the reducing agent used in this converter is influenced within such high temperature range by organonitrogen compounds such as peroxyacetyl nitrate and alkyl nitrates, it is impossible in the presence of such compounds to selectively and quantitatively convert nitrogen dioxide alone into nitrogen monoxide. The carbides of Yamaki

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are taught as being able to cause the selective conversion of nitrogen dioxide at a lower temperature. The tables and examples teach that the molybdenum carbide is capable of efficiently converting nitrogen dioxide to nitrogen monoxide.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the molybdenum carbide of Yamaki into the device and method of Izumi because of the ability to reduce the conversion temperature and efficiency as taught by Yamaki.

8. Claims 3-5, 9, 13-15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Izumi as applied to claims 1-2 and 12 above, and further in view of Lawson as explained above. Izumi does not teach measurement of other gases or a separate analyzer room. However it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the measurement of additional gases and the separate analyzer room as taught by Lawson into the Izumi apparatus for the ability of further characterizing the exhaust or flue gases.

9. Claims 11, 21, 30-31 and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Izumi as applied to claims 1, 12 and 25 above, and further in view of Matsuda (US 3,977,836) or Burrows (US 5,739,038). Izumi does not teach addition of a span gas.

In the patent Matsuda teaches method and apparatus for measuring an ammonia concentration of a gas by a process that includes measurement of nitrogen oxides. Element 32 of figure 3 is a span gas feeder and is used in the calibration of the instrument (see columns 3-4 and the description of figure 7 in column 7).

In the patent Burrows teaches a spectrometer gas analyzer system to monitor emission of environmental gases such as nitrogen oxides from industrial processes. Column 9, line 48 to column 10, line 9 and column 12, lines 47-63 teach the use of full-scale span calibration of the analyzer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the span gas device and process as taught by Matsuda or Burrows into the Izumi apparatus and method for their recognized ability to calibrate the measurement process.

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10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additionally cited art relates to measurement of stack or flue gases from industrial processes.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose current telephone number is (703) 308-3989. After about December 16, 2003, this number will change to (571) 272-1265 as a result of the examiner moving to the new USPTO location. The examiner's schedule is variable between the hours of about 5:30 AM to about 5:00 PM on Monday through Thursday and alternate Fridays.

For communication by fax to the organization where this application or proceeding is assigned, (703) 305-7719 may be used for official, unofficial or draft papers. When using this number a call to alert the examiner would be appreciated. Numbers for faxing official papers are 703-872-9310 (before finals), 703-872-9311 (after-final), 703-305-7718, 703-305-5408 and 703-305-5433. The above fax numbers will generally allow the papers to be forwarded to the examiner in a timely manner.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



December 1, 2003

ARLEN SODERQUIST
PRIMARY EXAMINER